

CLAIMS

1. A cellular communications network including:

call setup means operable, in a call setup process for setting up a call for a mobile station of the network, to allocate respective uplink and downlink channels between the mobile station and a first one of a plurality of base transceiver stations of the network, and to provide the mobile station and at least one further base transceiver station of the said plurality, neighbouring the said first base transceiver station, with call setup information for use by the mobile station and the or each said further base transceiver station to allocate respective uplink and downlink channels between the further base transceiver station concerned and the mobile station; and

hand-off control means operable initially, upon completion of the call setup process, to set the said first base transceiver station to an active state, in which its said uplink and downlink channels are in use, and to set the or each said further base station to a dormant state in which the uplink and downlink channels of the further base transceiver station concerned are not in use, the hand-off control means also being operable when, during the course of the call, it is determined that the mobile station should communicate with the, or one of the, further base transceiver stations, to employ such call setup information provided in the call setup process to bring about change of that further base transceiver station from the said dormant state to the said active state.

2. A network as claimed in claim 1, wherein the said hand-off control means are operable to identify a single base transceiver station that is to communicate with the mobile station at any one time during the course of the said call.

3. A network as claimed in claim 2, wherein the said

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hand-off control means are operable, when causing one of the base transceiver stations to change from the said dormant state to the said active state, to cause the base transceiver station that is currently in the active state to change to the dormant state.

4. A network as claimed in any preceding claim, wherein the said call setup means are operable, in the said call setup process, to cause the mobile station and the or each said further base transceiver station to exchange channel negotiation signalling for allocating the said uplink and downlink channels therebetween.

5. A network as claimed in any preceding claim, wherein the said call setup information provided to the or each further base transceiver station and/or to the mobile station includes one or more of the following:

service rate, channelisation code(s), scrambling code(s) of the uplink and/or downlink channels.

6. A network as claimed in any preceding claim, wherein the said hand-off control means include:

monitoring means, included in the said mobile station, for providing respective signal measures for the said first base transceiver station and the or each further base transceiver station, each signal measure serving to indicate the performance of a communications channel between the mobile station and the base transceiver station concerned; and

base transceiver station selection means for determining, in dependence upon the said signal measures, with which of the base transceiver stations the mobile station should communicate.

7. A network as claimed in claim 6, wherein the said base transceiver station selection means are also provided in the mobile station, and the mobile station is operable to include, in one or more uplink signals transmitted thereby, an uplink control message

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identifying one of the base transceiver stations with which the mobile station requests communication.

8. A network as claimed in claim 7, wherein the mobile station transmits such an uplink control message in each frame of the channel signals between the mobile station and the base transceiver station with which it is in communication.

9. A network as claimed in claim 8, wherein the said uplink control message transmitted in each frame identifies the base transceiver station determined in dependence upon the signal measures produced based on the communications-channel performance in the preceding frame.

10. A network as claimed in any one of claims 6 to 9, wherein the said monitoring means produce the said signal measure for each base transceiver station based on a monitoring period of no longer than one frame of the said communications channel.

11. A network as claimed in any one of claims 6 to 10 wherein, for the or each said base transceiver station that is in the said dormant state, the said signal measure indicates the performance of a downlink common control channel from the base transceiver station concerned to the mobile station.

12. A network as claimed in any preceding claim, wherein the same uplink channel and/or the same downlink channel is/are assigned by the network to the mobile station for use in communicating with two or more of the said base transceiver stations of the said plurality.

13. A network as claimed in claim 12, being a code-division multiple-access network, wherein the same set of codes is assigned to the mobile station for the uplink and/or downlink channels between it and two or more of the said base transceiver stations of the network.

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14. A mobile station, for use in a cellular communications network, including:

call setup information receiving means, operable in a call setup process for setting up a call between the network and the mobile station, to receive from a first base transceiver station of the network call setup information for use by the mobile station to allocate respective uplink and downlink channels between the mobile station and at least one further base transceiver station of the network;

call setup information storage means for storing the received call setup information; and

hand-off control means operable initially, following completion of the said call setup process, to cause the mobile station to communicate with the said first base transceiver station and operable when, during the course of the call it is determined that the mobile station should communicate with the, or one of the, further base transceiver stations, to employ the stored call setup information received in the call setup process to activate the said uplink and downlink channels between the mobile station and that further base transceiver station.

15. A mobile station as claimed in claim 14, further including:

monitoring means for producing a signal measure for the said first base transceiver station and for the or each further base transceiver station, which signal measure serves to indicate the performance of a communications channel between the mobile station and the base transceiver station concerned.

16. A mobile station as claimed in claim 15, further comprising base transceiver station selection means for determining, in dependence upon the said signal measures, with which of the base transceiver stations the mobile station should communicate.

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17. A mobile station as claimed in claim 16, wherein the mobile station further includes:

message means operable to include, in one or more uplink signals transmitted by the mobile station, an uplink control message identifying the or each determined base transceiver station.

18. A base transceiver station, for use in a cellular communications network, including:

call setup information receiving means operable, in a call setup process for setting up a call between the network and a mobile station of the network that is currently being served by another base transceiver station of the network neighbouring the claimed base transceiver station, to receive call setup information relating to the call, for use by the claimed base transceiver station to allocate respective uplink and downlink channels between it and the mobile station;

call setup information storage means for storing the received call setup information; and

hand-off control means operable initially, following completion of the said call setup process, to maintain the claimed base transceiver station in a dormant state, in which the said uplink and downlink channels are not in use, and, when it is determined by the network that the mobile station should communicate with the claimed base transceiver station, to employ the stored call setup information received in the call setup process to change the base transceiver station from the said dormant state to an active state in which its said uplink and downlink channels are in use.

19. A base transceiver station as claimed in claim 18, further including:

uplink control message receiving means operable, when the base transceiver station is in the active state, to detect, in an uplink signal transmitted by the mobile station to the base transceiver station, an

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uplink control message identifying a base transceiver station of the network with which the mobile station requests communication;

5 comparison means for comparing the identity of the requested base transceiver station specified by the received uplink control message with its own base transceiver station identity; and

10 status control means for changing the base transceiver station from the said active state to the said dormant state if the requested base transceiver station identity is different from the said own base transceiver station identity.

20. A base transceiver station as claimed in claim 19, further including:

15 new base transceiver station informing means operable, when the requested base transceiver station identity is different from the said own base transceiver station identity, to send to base station controller means of the network a message specifying the requested base transceiver station identity.

21. A communications method for use in a cellular mobile communications network, including the steps of:

25 in a call setup process, for setting up a call for a mobile station of the network, allocating respective uplink and downlink channels between the mobile station and a first one of a plurality of base transceiver stations of the network, and providing the mobile station and at least one further base transceiver station of the said plurality, which further base transceiver station neighbours the said first base transceiver station, with call setup information for use by the mobile station and the or each said further base transceiver station to allocate respective uplink and downlink channels between the further base transceiver station concerned and the mobile station;

35 after completion of the call setup process,

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initially setting the first base transceiver station to an active state, in which the said uplink and downlink channels between it and the mobile station are in use, and setting the or each further base transceiver station to a dormant state, in which the said uplink and downlink channels between the further base transceiver station concerned and the mobile station are not in use; and

when, during the course of the call, it is determined that the mobile station should communicate with the, or one of the, further base transceiver stations, employing such call setup information provided in the call setup process to bring about change of that further base transceiver station from the said dormant state to the said active state.

22. A cellular communications network in which the same uplink channel and/or the same downlink channel is/are assigned by the network to a mobile station of the network for use in communicating with a plurality of base transceiver stations of the network, and the mobile station uses that/those same assigned channel(s) both before and after a hand-off operation in which the mobile station is handed off from one base transceiver station of the said plurality to another base transceiver station of the said plurality.

23. A network as claimed in claim 22, being an analog network, wherein the same carrier frequency is assigned to the mobile station for communication in the uplink and/or downlink direction with all of the base stations of the said plurality.

24. A network as claimed in claim 22, being a Global System for Mobile Communication (GSM) network, wherein the same carrier frequency and the same time slot is assigned to the mobile station for communication in the downlink direction and/or uplink direction with all of the base transceiver stations of the said plurality.

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25. A network as claimed in claim 22, being a Global System for Mobile Communication (GSM) network employing frequency hopping, wherein the same set of carrier frequencies and the same time slot and the same hopping sequence is assigned to the mobile station for communication in the uplink direction and/or downlink direction with all of the base transceiver stations of the said plurality.

26. A network as claimed in claim 22, being a code-division multiple access (CDMA) network, wherein the same set of codes is assigned to the mobile station for use in communicating in the uplink direction and/or downlink direction with all of the base transceiver stations of the said plurality.

27. A network as claimed in any preceding claim, wherein the assignment to the mobile station of the said same uplink channel and/or downlink channel is made when a call is set up between the network and the mobile station, and the same assigned channel(s) is/are used by the mobile station for communication with different base transceiver stations of the said plurality for all or part of the duration of the call.

28. A network as claimed in any one of claims 22 to 27, wherein the same uplink channel and/or the same downlink channel is/are assigned by the network to the mobile station for use in communicating with substantially all of the base transceiver stations of the network.

29. A network as claimed in any one of claims 22 to 28, wherein the or each assigned channel is a traffic channel.

30. A network as claimed in any one of claims 22 to 29, wherein the said hand-off operation is a soft hand-off operation in which the said mobile station is in communication with more than one base transceiver station of the network.